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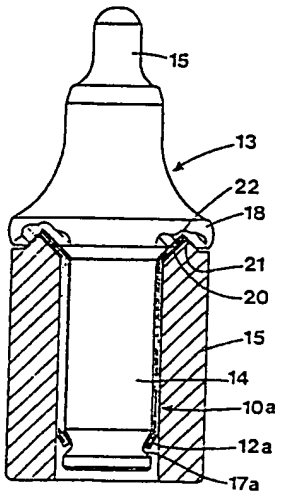
(54) Tool for breaking, cutting or working of solid materials.

(57) The present invention refers to a tool for breaking, cutting or working of solid materials, said tool (13) being intended to be rotatably mounted in a holder (16) and being provided with a hard material cutting insert (15) and a generally cylindrical shaft (14), that is intended to be received in the holder (16), and that a clip (10;10a;10b;10c;10d) is mounted on the shaft (14), said clip (10-10d) being generally cylindrical and having a slot (11) that extends between the ends of the clip, and that the shaft (14) has a tangentially extending groove (17;17a;17b;17c;17d).

The aim of the invention is to present a clip (10-10d) that decreases the wearing of the shaft (14) of the tool (13) and the holder (16). Also the rotation of the tool (13) in the holder (16) is improved.

The characterizing features of the tool (13) are that the shaft (14) has essentially the same diameter on both sidesof the groove (17-17d) and that the clip (10-10d) has engagement means (12-12d) for ccoperation with the groove (17-17d).

FIG 4



EP 0 295 232 A1

Description

Tool for breaking, cutting or working of solid materials

The present invention refers to a tool for breaking, cutting or working of solid materials, said tool being intended to be rotatably mounted in a holder and being provided with a hard material cutting insert and a generally cylindrical shaft that is intended to be received in the holder, and that a clip is mounted on the shaft, said clip being generally cylindrical and having a slot that extends between the ends of the clip, and that the shaft has a tangentially extending groove.

In tools of the type mentioned above two types of so-called clips are previously known.

The first type is usually called "dog-collar" and is, e.g., disclosed in US-A-3,519,309. This type of clip has an axial extension that is only about half the length of the shaft, the whole of said clip being received in a groove on the shaft of the tool, said groove usually being displaced towards the free end of the shaft. In mounted position the clip lies flush with the shaft on both sides of the groove. This means that an essential portion of the shaft has a direct contact with the recess in the holder that receives the tool. Such an arrangement causes a strong wearing both of the shaft and the holder upon rotation of the tool.

The other type of clip, called "long-sleeve" extends along substantially the whole length of the shaft. At the free end of the shaft a collar is provided that constitutes a land surface for the clip and thus prevents axial displacement of the tool relative to the clip. When the tool is mounted in its holder the collar is flush to the clip. This means that there is a direct contact between the collar and the holder. This arrangement gives rise to a strong wearing of collar and holder already at a small inclination of the tool due to the cutting forces.

The aim of the present invention is to disclose a tool of the type mentioned above, said tool eliminating the shortcomings mentioned above by avoiding a direct contact between the shaft and the holder. Also a facilitated mounting of the tool is achieved.

The aim of the invention is realized by a tool that has been given the characteristics of the appending claims.

Below embodiments of the invention will be described, reference being made to the enclosed drawings where Fig. 1A shows a side view of a clip according to the invention; Fig. 1B shows an end view of a clip according to the invention; Fig. 2 shows the clip according to Fig. 1 in mounted position; Fig. 3 shows an alternative embodiment of a clip according to the invention; Fig. 4 shows the clip according to Fig. 3 in mounted position; Fig. 5A shows a side view of a further alternative embodiment of a clip according to the invention; Fig. 5B shows an end view of the clip according to Fig. 5A; Fig. 6 shows the clip according to Fig. 5 in mounted position; Fig. 7 shows still a further alternative embodiment of a clip according to the invention; Fig. 8 shows the clip according to Fig. 7 in mounted position; Fig. 9 shows still a further alternative embodiment of a clip according to the invention; and Fig. 10 shows the clip according to Fig. 9 in mounted position.

The clip 10 of Figs. 1A and 1B, in the shape of a sleeve having a slot 11, is generally seen cylindrical. The slot 11 runs in the axial direction of the sleeve and extends along the entire length of the sleeve.

In the disclosed embodiment the slot 11 has a tangential extension that is 1/10 of the entire circumference of the clip 10.

The clip 10 is provided with a number of inwardly bent tongues 12 that are stamped from the clip 10. In the disclosed embodiment the tongues 12 are situated on the same level seen in axial direction and displaced towards one end of the clip. The free ends of the tongues 12 are directed from the longitudinal centre of the clip. Within the scope of the invention it is also possible to have the free ends of the tongues directed in the opposited direction.

In Fig. 2 the clip is shown in mounted position surrounding the shaft 14 of a tool 13 for breaking solid materials, said tool 13 having a hard material cutting insert 15. The shaft 14 has a generally seen cylindrical shape. The clip 10 is in its turn received in a tool holder 16 that is only indicated in Fig. 2.

As can be seen from Fig. 2, the clip 10 extends along the entire length of the shaft 14, the tongues 12 being in engagement with a tangential groove 17 in the shaft 14. The purpose of the tongues 12 is thus to anchor the shaft 14 in axial direction relative to the clip 10. In reality this means that the shaft is releasably anchored relative to the holder 16 since the clip 10 clamps against the holder 16.

In this connection it should be noted that the orientation of the tongues 12 disclosed in Fig. 2 provides an extremely safe anchoring of the tool against ejection out of the holder 16. The diameter of the shaft 14 is essentially the same on both sides of the groove 17.

From Fig. 2 it is apparent that a direct contact between the shaft 14 and the holder 16 is not possible. The only direct contact between the tool 13 and the holder 16 is via flange 18 of the tool 13.

The clips 10 are manufactured from spring steel and in connection therewith it is so arranged that the diameter of the clips is somewhat bigger than the diameter of the recess in the holder 16. This means that after mounting of the shaft 14 of the tool 13, including the clip 10, in the holder 16 the clip 10 will clamp against the holder 16 and consequently the shaft 14 of the tool 13 will rotate relative to the clip 10.

In the embodiment disclosed in Fig. 3 the clip 10a is provided with an outwardly extending conical collar 20 at one end of the clip 10a and an inwardly extending conical portion 12a at the other end of the clip 10a. A slot extends in axial direction along the entire length of the clip 10a.

As can be seen from Fig. 4 the collar 20 extends along the inner side of a pointed, circumferentially extending, projection 21 on the holder 16. Said

projection 21 with the collar 20 cooperates with a circumferentially extending groove 22 of a corresponding shape on the lower side of the flange 18 of the tool 13. The projection 21 and the groove 22 cooperate in order to prevent dirt and other unwanted particles from penetrating between the shaft 14 and the holder 16.

The free end of the portion 12a cooperates with a groove 17 on the shaft 14 of the tool 13.

The portions of the shaft 14 on both sides of the groove 17 have essentially the same diameter. Unlike the embodiment according to Figs. 1 and 2 the clip 10a does not reach beyond the groove 17 but the free end of the portion 12a ends in the groove 17. The reason therefore is that the groove 17 is located so close to the free end of the shaft 14 that the risk for contact between said end and the holder 16 in reality has been eliminated.

By the disclosed design of the portion 12a of the clip 10a it is immediately realized that the mounting of the tool 13 is facilitated by the fact that the portion 12a guides the shaft 14 into the holder 16.

The embodiment disclosed in Figs. 5 and 6 refers to a sleeve-shaped clip 10b having inwardly bent tongues being located at about half the height of the clip 10b in axial direction. As is apparent from Fig. 6 the groove 17b is located at about half the height of the shaft 14 in its axial direction.

The advantage of this embodiment is that the tongues 12b and the groove 17b are located in the area that has the lowest stress when the tool is subjected to a lateral load. This facilitates the rotation of the shaft 14 of the tool 13 relative to the clip 10b.

In similarity to the embodiment of Figs. 1 and 2 the clip 10b extends along the entire length of the shaft 14. In order to prevent penetration of dirt and other particles between the shaft 14 and the holder 16, said holder 16 is likewise provided with a projection 22 that cooperates with a groove 23 of the flange 18.

The embodiment according to Figs. 7 and 8 refers to a clip 10c that has a cylindrical basical shape and a slot 11 that extends along the entire length of the clip 10c. This embodiment corresponds to the embodiment according to Figs. 5 and 6 with the difference that instead of stamped tongues the engagement means consist of a tangentially extending corrugation 12c that has been manufactured through roll forming of a sheet that afterwards has been bent to cylindrical basical shape and then hardened to get the resilient characteristics.

The embodiment of Figs. 9 and 10 refers to a clip 10d having engagement means in the shape of a corrugation 12d. This corrugation 12d extends in tangential direction and is located in the area of one end of the clip 10d. In similarity to all of the embodiments the clip 10d is provided with an axially extending slot 11, that runs along the entire length of the clip 10d.

The corrugation 12d cooperates with a groove 17d on the shaft 14 of the tool 13.

For all the embodiments described above the shaft 14 has essentially the same diameter on both sides of the groove 17; 17a; 17b; 17c; 17d.

Said groove 17-17d has a relatively seen small extension in axial direction. This is favourable especially when manufacturing the shaft of the tool by cold forming.

For all of the embodiments the portion of the clip that surrounds the shaft 14 has generally seen cylindrical shape and the clip itself has some kind of engagement means, e.g. tongues, a bent end portion, a corrugation. The clip extends preferably along the entire length of the shaft 14 or at least along a major portion of the length of the shaft 14.

In the embodiments a straight axial slot has been disclosed. However, also other types of slots, e.g. such providing a cooperating tongue and recess in the clip, are within the idea of the invention.

It should also be pointed out that the characterizing features of the different embodiments can be combined with each other. Thus, the embodiments according to Figs. 1, 2; 5, 6; 7, 8 or 9, 10 can be provided with a collar 20 according to the embodiment of Fig. 3, 4.

The invention is thus in no way restricted to the embodiments described above but can be freely varied within the scope of the appending claims.

Claims

1. A tool for breaking, cutting or working of solid materials, said tool (13) being intended to be rotatably mounted in a holder (16) and being provided with a hard material cutting insert (15) and a generally cylindrical shaft (14), that is intended to be received in the holder (16), and that a clip (10;10a;10b;10c;10d) is mounted on the shaft (14), said clip (10-10d) being generally cylindrical and having a slot (11) that extends between the ends of the clip (10-10d), and that the shaft (14) has a tangentially extending groove (17;17a;17b;17c;17d),
characterized in that the diameter of the shaft (14) on both sides of the groove (17-17d) is essentially the same and that the clip (10-10d) has engagement means (12;12a;12b;12c;12d) for cooperation with the groove (17-17d).

2. A tool according to claim 1,
characterized in that the groove (17-17d) has a relatively seen small extension in axial direction.

3. A tool according to claim 1 or 2,
characterized in that the clip (10-10d) extends along substantially the whole length of the shaft (14).

4. A tool according to any one of claims 1 - 3,
characterized in that the engagement means of the clip (10;10b) consist of bent tongues (12;12b) that are stamped out of the clip (10;10b).

5. A tool according to claim 4,
characterized in that the free ends of the tongues (12;12b) are directed towards the free end of the shaft (14).

6. A tool according to any one of claims 1 - 3,
characterized in that the engagement means of the clip (10a) consist of an inwardly bent free

edge (12a) of the clip (10a).

7. A tool according to any one of claims 1 -6, **characterized** in that the clip (10a) at one end has an outwardly extending, conical collar (20).

8. A clip intended to be mounted on the shaft (14) of a tool (13) for breaking, cutting or working of solid materials, said clip (10;10a;10b;10c;10d) being generally seen cylindrical and provided with a slot (11) that extends between the ends of the clip (10-10d), **characterized** in that the clip (10-10d) has engagement means (12;12a;12b;12c;12d) for cooperation with a groove (17;17a;17b;17c;17d) on the shaft (14) of the tool (13).

9. A clip according to claim 8, **characterized** in that the engagement means consist of tongues (12;12b) that are stamped out of the clip (10;10b).

10. A clip according to claim 8 or 9, **characterized** in that it at one end has an outwardly extending, conical collar (20).

FIG 1A

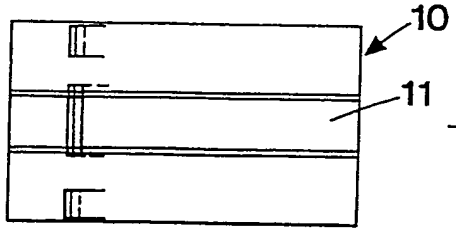


FIG 1B

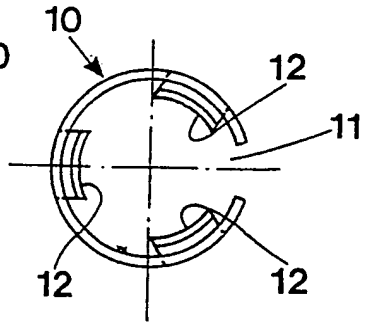


FIG 2

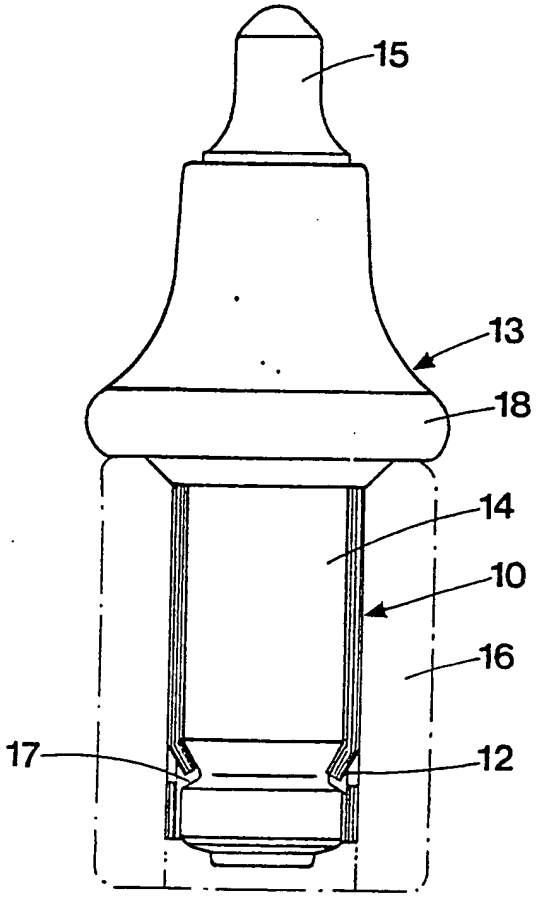


FIG 3

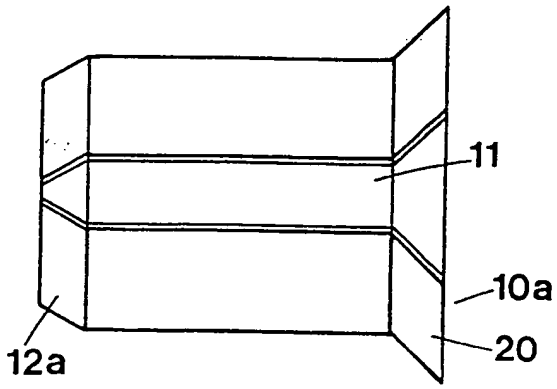


FIG 4

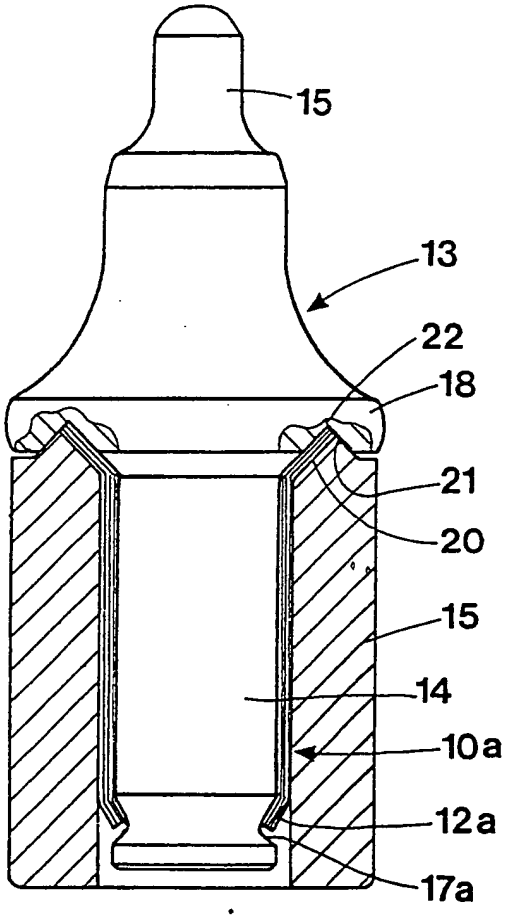


FIG 6

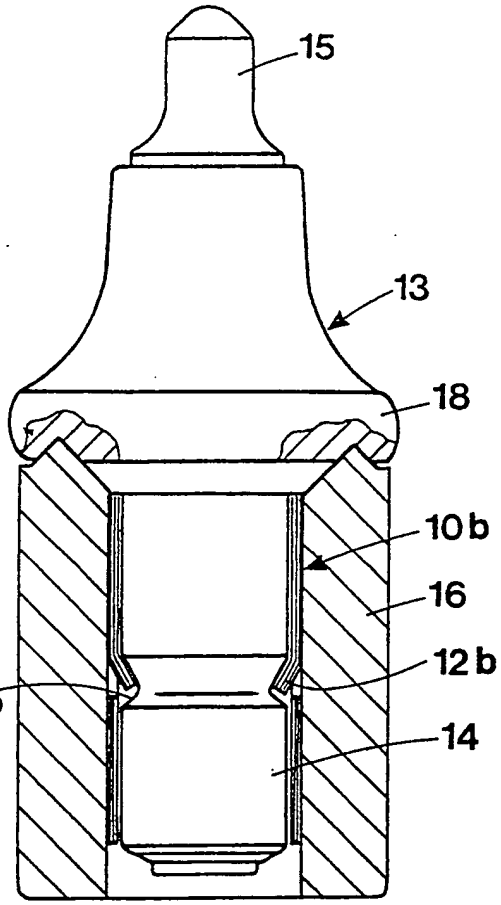


FIG 5A

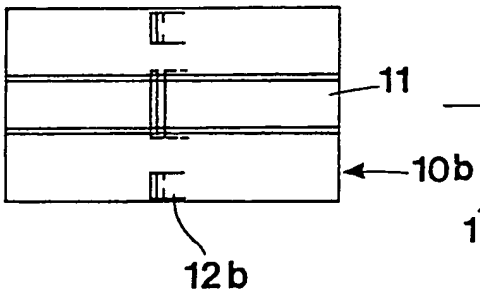


FIG 5B

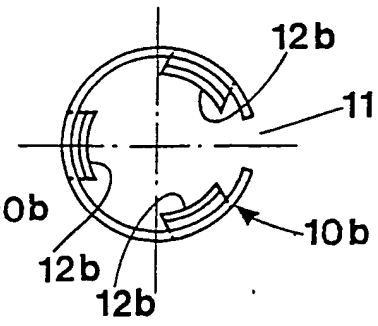


FIG 9

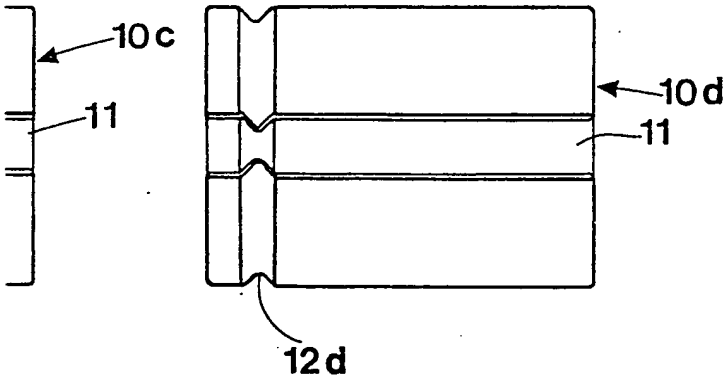
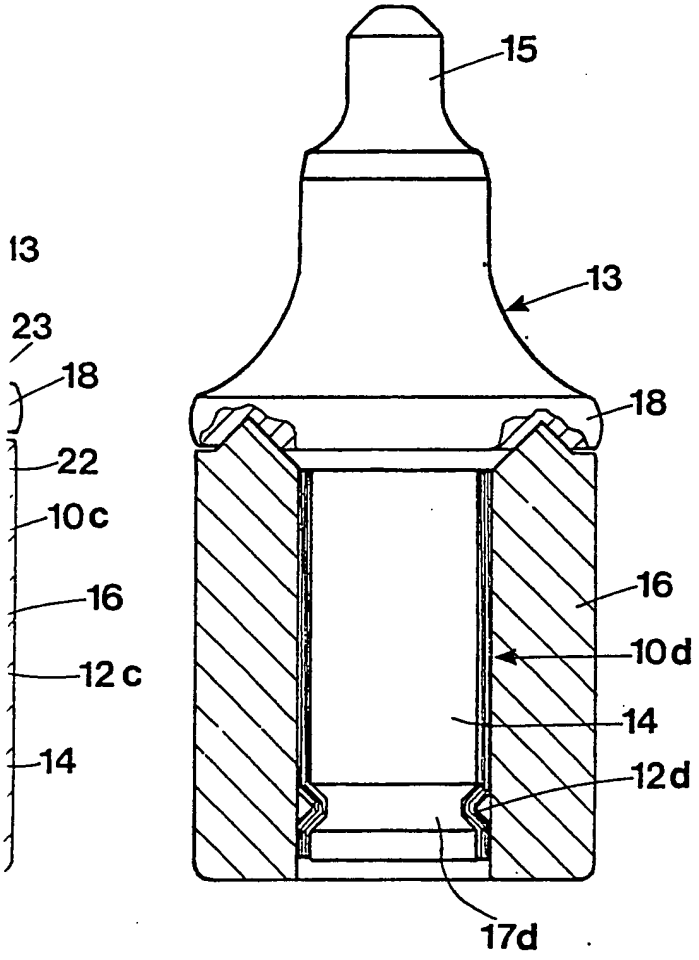


FIG 10



Application Number

EP 88 85 0201

elevant claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
3,6,8	E 21 C 35/18
10	
8	
3,8	
5,8,9	
3,8	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

E 21 C
E 21 D
E 02 F
B 28 D

Examiner

RAMPELMANN J.

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